

What is claimed is:

1. A method for providing reactive material enclosed by covering material on a substrate, the method comprising
  - providing a substrate having a surface,
  - 5 fixing a shadow mask over the substrate in a position to align an aperture of the shadow mask with a portion of the surface,
  - positioning the shadow mask and substrate in a vacuum deposition chamber having a reactive material deposition source and a covering material deposition source,
  - 10 providing a vacuum in the vacuum deposition chamber,
  - evaporating reactive material from the reactive material deposition source such that the reactive material passes through the aperture of the shadow mask and deposits on the surface to define an area of coverage of the reactive material, and
  - evaporating covering material from the covering material deposition
  - 15 source to produce an area of coverage of the covering material that is greater than the area of coverage of the reactive material and that includes the area of coverage of the reactive material, to enclose the reactive material coated on the substrate.
2. The method of claim 1 wherein the area of coverage of the covering material  
20 is from 0.1 to 10 percent greater than the area of coverage of the reactive material.
3. The method of claim 1 comprising rotating the substrate on an axis through the portions of surface and perpendicular to the portion of surface, during evaporation of the covering material,  
25 and wherein the covering material deposition source is located at an angle oblique to the axis.
4. The method of claim 1 comprising positioning the shadow mask and substrate in a fixture to fix the shadow mask against the substrate.

5. The method of claim 4 wherein the shadow mask aperture is a distance in the range from about 20 microns to 100 microns from the portion of surface.
- 5 6. The method of claim 1 wherein the reactive material comprises a material selected from rubidium, cesium, and gallium, potassium, lithium, and sodium.
7. The method of claim 5 wherein  
when the reactive material comprises rubidium, the covering material  
10 comprises aluminum; and  
when the reactive material comprises gallium, the covering material  
comprises tungsten.
8. The method of claim 1 comprising depositing a layer of reactive material  
15 having a thickness in the range from 0.5 to 10 microns.
9. The method of claim 1 comprising depositing a layer of covering material over the deposited reactive material, the covering material having a thickness of from about 0.5 to 10 microns.
- 20 10. The method of claim 1 wherein during evaporating of the reactive material, the substrate is rotated on an axis normal to and through the portion of surface.
11. The method of claim 1 wherein during evaporating of the covering material,  
25 the substrate is rotated on an axis normal to and through the portion of surface, at a speed in the range from 10 revolution per second to 1 revolution per 5 seconds.
12. The method of claim 11 wherein the covering material deposition source is at an angle of incidence in the range from 1 to 10 degrees from the axis.

13. A method for providing layers of material on a substrate, the method comprising

providing a substrate including a surface,

5 fixing a shadow mask over the substrate in a position to align an aperture of the shadow mask with a portion of the surface,

positioning the shadow mask and substrate in a vacuum deposition chamber having a first material deposition source and a second material deposition source,

10 providing a vacuum in the vacuum deposition chamber,

evaporating first material from the first material deposition source at an angle of incidence substantially normal to the portion of surface, such that the first material passes through the aperture of the shadow mask and deposits on the portion of surface to define an area of coverage of the first material, and

15 while rotating the substrate and shadow mask on an axis normal to the portion of surface, evaporating second material from the second material deposition source at an angle of incidence oblique to the axis, such that second material passes through the aperture of the shadow mask and deposits on the first material to produce an area of coverage of the second material greater than the area of coverage of the  
20 first material and including the area of coverage of the first material.

14. An assembly comprising

a substrate including a surface,

25 a shadow mask having a deposition opening spaced apart from the surface for defining an area of deposition on the substrate surface,

a fixture that fixes the position of the substrate relative to the shadow mask, and

a device to rotate the fixture on an axis normal to the substrate surface.

15. A substrate comprising first deposited material and second deposited material, the first material having a first area of coverage and the second material having a second area of coverage that includes the first material area of coverage and area that surrounds the first material area of coverage.

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16. The substrate of claim 15 wherein the first material is enclosed by the second material.

17. The substrate of claim 15 wherein the first material is a reactive material.

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18. The substrate of claim 15 wherein the first material is selected from the group consisting of rubidium, cesium, gallium, potassium, lithium, and sodium.

15 19. The substrate of claim 15 wherein the second material is selected from the group consisting of aluminum, tungsten, and a wax.

20. The substrate of claim 15 wherein the substrate is selected from the group consisting of a semiconductor, Pyrex, and quartz.

20 21. A method of preparing a microelectronic mechanical device, the method comprising

depositing first material onto a substrate surface,

depositing second material over the first material to enclose the first material,

25 encapsulating the first and second materials deposited on the substrate, and

degrading the second material to expose the first material.

22. The method of claim 21 wherein the first material is a reactive material.

23. The method of claim 21 wherein the second material is a degradable material that can be degraded by heat or laser radiation.

5 24. The method of claim 21 wherein the enclosure comprises a material that is transparent to laser radiation.

25. The method of claim 24 comprising degrading the second material by laser irradiation.

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26. The method of claim 21 comprising degrading the second material by heating the second material.

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